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EXAMINER

GERSTL, SHANE F

ART UNIT	PAPER NUMBER
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2183

DATE MAILED: 04/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/858,308

Applicant(s)

NAJAM ET AL.

Examiner

Shane F Gerstl

Art Unit

2183

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2001 and 15 May 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 May 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-41 have been examined.

Papers Received

2. Receipt is acknowledged of declaration and information disclosure statement papers submitted, where the papers have been placed of record in the file.

Information Disclosure Statement

3. The references given in the information disclosure statement filed 29, August 2001 have each been considered except for references A77 and A99 because copies have not been provided.

Specification

4. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

5. The abstract of the disclosure is objected to because line 2 uses the phrase "is disclosed," which is unnecessary as it is implied in the same manner as stated in the paragraph above.

6. The abstract of the disclosure is objected to because line 2 contains the word "interface" but it does not grammatically fit the context since an apparatus has already been defined as being used for interfacing. Also, the word "co-processor" in line 3 should have an "s" at the end to read "co-processors" simply to remain consistent with the other uses of the word in the abstract. Finally, the word "allow" in line 6 should read "allows" in order to be grammatically correct.

Correction is required. See MPEP § 608.01(b).

7. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Apparatus and Method for Interconnecting a Processor to Coprocessors Using a Shared Memory as the Communication Interface.

8. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

9. The disclosure is objected to because of the following informalities: page 1 lists the copending and commonly assigned applications but does not give the serial number for these applications. The appropriate serial numbers are as follows:

Attorney Ref. No. 10736/6: 09/858,309

Attorney Ref. No. 10736/7: 09/858,323

Attorney Ref. No. 10736/8: 09/858,324

Appropriate correction is required.

Drawings

10. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 328A and 328B. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

11. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 302, 310A, 310B, 312A, 312B, 314A, 314B, 316, 318A, 318B, 320A, 320B, 322A, 322B, 324, 326, 328, 330, 332, 340B, 346, 352A, 352B, 354A, 354B, 1700, 1702, 1704, 1706, 1708, 1710, 1712, 1714, 1716, 1718, 1720, 1722, 1724, 1726, 1728, 1730, 1732, 1734, 1736, 1738, 1740, 1744, 1746, 1748, 1750, 1752, 1754, 1756, 1758, 1760, and 1762. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

12. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

13. Claims 6, 16, and 29 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which

was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claims state that the co-processor is a content addressable memory. This is not possible since a memory does not perform processing. The specification lends no support for these claims. The specification states that the co-processor comprises or includes a content addressable memory, but is not strictly defined by it. Since one of ordinary skill in the art would not be able to make and use a co-processor that consists of a content addressable memory since there is no processing function in it, and the specification does not provide any detail on how to make and use such a device, the claims do not meet the enablement requirement.

14. Claims 7, 17, 30, and 38 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification does not give a concise definition of the term but only a broad purpose. Paragraphs 57 and 58 of the specification states that the classification or CAM processors are used to facilitate certain search and compare operations that would otherwise be computationally intensive and degrade the performance of the processor. Since the term "classification processor" is not well known in the art and the specification does not give any indication on how to make such a processor or what its specific functionality is other than simple results, the claims do not meet the enablement requirement.

15. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

16. Claims 3, 6, 7, 16, 17, 29, 30, 38, and 41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

17. In regard to claim 3 it is unclear what it means for the boundary to comprise the difference between the first and second protocols. This would mean that at least part of the definition of this physical boundary is the difference between two formats, which makes little sense. The examiner is taking the Applicant to mean that the interface (and not the boundary) compromises (and not comprises) the difference between the first and second protocols so that communication can take place.

18. Claims 6, 16, and 29 state that the co-processor is a content addressable memory. This is not possible since a memory does not perform processing. The specification lends no support for these claims either. The examiner is taking the claims to mean that the co-processor comprises a content addressable memory as stated in claim 37 so that the co-processor includes the memory within it, as indicated in the specification, but is not strictly defined by it.

19. In regard to claims 7, 17, 30, and 38 it is unknown what a classification processor is. The specification does not give a concise definition of the term but only a broad purpose. Paragraphs 57 and 58 of the specification states that the classification or CAM processors are used to facilitate certain search and compare operations that would otherwise be computationally intensive and degrade the performance of the

processor. Therefore, the examiner is taking a classification processor to be any processor that uses search and compare operations to improve system performance.

20. Claim 41 recites the limitations "said processor and "said co-processor". There is insufficient antecedent basis for these limitations in the claim. The parent claim defines a first processor and a second processor so it is unclear which processor is meant by "said processor" and no "co-processor" has been defined. The examiner is taking the claims to mean, "said first processor communicates with said second processor as if said second processor was directly connected with said first processor."

Claim Rejections - 35 USC § 102

21. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

22. Claims 1-5, 8-9, 11-15, 18-19, 22-28, 31, 34-36, and 39 are rejected under 35 U.S.C. 102(b) as being anticipated by Rutman (5,313,586).

23. In regard to claim 1, Rutman discloses a packet processing system comprising:

- a. a processor (figure 3, element 270);
- b. a co-processor (figure 3, element 260) separated from said processor by a boundary; Column 4, lines 24-26 explicitly shows that element 260 is in fact a co-processor. The figure shows a boundary between the processor and co-processor in being all the space between the two processors.

- c. and an interface (figure 3, elements 200, 280, 340, and 350) coupled with said processor and said co-processor and operative to bridge said boundary,
- d. said interface including:
 - i. a memory coupled with said processor and said co-processor (figure 3, element 200, VRAM), said memory having at least two read/write ports for reading and writing data to said memory (figure 3, A and B) wherein said processor is coupled with one of said at least two ports and said co-processor is coupled with the other of said at least two ports; Figure 3 shows that the processor (P1) is coupled to port A of the memory and the co-processor (P2) is coupled to port B. Column 4, lines 22-23, shows that these blocks, A (220) and B (210), are in fact ports (serial ports) of the VRAM memory.
 - ii. and control logic coupled with said at least two read/write ports (figure 3, elements 280, 340, and 350); Column 4, lines 26-28 show that arbitration is performed to determine which port has access to the memory and thus the arbiter (280) is coupled to the ports. In addition, column 4, lines 38-41 show that P2 CTL (340) generates memory control signals and column 5, lines 5-8 show that P1 CTL (350) generates memory requests for the arbiter. P1 CTL (350) and P2 CTL (340) are both shown in the figure to be coupled to the arbiter and thus are also indirectly coupled to the ports.

e. wherein said processor stores data intended for said co-processor to said memory and reads data stored by said co-processor from said memory independent of said co-processor; said co-processor stores data intended for said processor to said memory and reads data stored by said processor from said memory independent of said processor; Column 3, lines 15-34 show that the memory is used for communication between processors as storage independent from the processors where data intended for the other processor is transferred when needed since communication is usually not immediately required. Column 3, lines 47-53 show that this communication is between a processor and coprocessor. In the embodiment of figure 3, the communication is also between the processor and coprocessor.

f. and said control logic operative to facilitate the reading of said stored data by said processor and said co-processor. As shown above, the control logic generates memory control signals and requests, which facilitate the reading of stored data during the communication between the processors.

24. In regard to claim 2, Rutman discloses the packet processing system of claim 1, wherein said boundary comprises a printed circuit board-to-printed circuit board connector coupled between said processor and said co-processor. Column 1, lines 23-25 show that the shared memory is a separate entity. With the memory being on a separate chip or circuit board and the processor and co-processor communicating via serial ports, as shown previously, the use of a circuit board-to circuit board connector in the form of a serial connector or cable must be used to couple the processor and co-

processor to the memory. Since the processor and co-processor are coupled to the same memory, they are also coupled to each other.

25. In regard to claim 3, Rutman discloses the packet processing system of claim 1, wherein said processor communicates with a first protocol and said co-processor communicates with a second protocol, said boundary comprising a difference between said first and second protocols. The enclosed second IEEE definition of "protocol" shows that a protocol includes conventions governing the format of message exchange between two communication terminals. As shown above, the processor and co-processor of Rutman communicate and are thus communication terminals. Column 5, lines 54-58 show that the processor and coprocessor operate with different bus widths. This means that the format of any communication or message exchange between the processor and coprocessor will be initially be of a different format and thus the processor and co-processor communicate with different protocols. Since Rutman discloses the ability of communication between a processor and coprocessor of different widths, he inherently includes as part of the interface a means for compromising the two protocols so that communication can occur.

26. In regard to claim 4, Rutman discloses the packet processing system of claim 1, wherein said processor is a network processor. The included IEEE definition of "network" as it pertains to data transmission is a series of points interconnected by communication channels. Since the processor (one point) is communicating with the co-processor (a second point) as shown above, the processor is communicating over a network and is thus a network processor.

27. In regard to claim 5, Rutman discloses the packet processing system of claim 1, wherein said co-processor is a task specific processor. Figure 3 shows that the co-processor (P2) is a graphics accelerator, thus performing the specific task of graphics acceleration.

28. In regard to claim 8, Rutman discloses the packet processing system of claim 1, wherein said control logic signals said processor when said co-processor has stored data to said memory. As shown above, the control logic sends signals to the memory and processor for their interaction. Column 1, lines 23-28 show that polling or interrupts are used in each processor so that each processor knows when data to be accessed is placed in the shared memory.

29. In regard to claim 9, Rutman discloses the packet processing system of claim 1, wherein said control logic signals said co-processor when said processor has written data to said memory. As shown above, the control logic sends signals to the memory and processor for their interaction. Column 1, lines 23-28 show that polling or interrupts are used in each processor so that each processor knows when data to be accessed is placed in the shared memory.

30. In regard to claim 11, Rutman discloses an interface (figure 3, elements 200, 280, 340, and 350) for coupling a processor (element 270) to a co-processor (element 260) across a boundary, said processor and said co-processor being separated by said boundary, said interface comprising:

- a. a memory coupled with said processor and said co-processor (figure 3, element 200, VRAM), said memory having at least two read/write ports for

reading and writing data to said memory (figure 3, A and B) wherein said processor is coupled with one of said at least two ports and said co-processor is coupled with the other of said at least two ports; Figure 3 shows that the processor (P1) is coupled to port A of the memory and the co-processor (P2) is coupled to port B. Column 4, lines 22-23, shows that the blocks, A (220) and B (210), are in fact ports (serial ports) of the VRAM memory.

b. and control logic coupled with said at least two read/write ports; (figure 3, elements 280, 340, and 350); Column 4, lines 26-28 show that arbitration is performed to determine which port has access to the memory and thus the arbiter (280) is coupled to the ports. In addition, column 4, lines 38-41 show that P2 CTL (340) generates memory control signals and column 5, lines 5-8 show that P1 CTL (350) generates memory requests for the arbiter. P1 CTL (350) and P2 CTL (340) are both shown in the figure to be coupled to the arbiter and thus are also indirectly coupled to the ports.

c. wherein said processor stores data intended for said co-processor to said memory and reads data stored by said co-processor from said memory independent of said co-processor; said co-processor stores data intended for said processor to said memory and reads data stored by said processor from said memory independent of said processor; Column 3, lines 15-34 show that the memory is used for communication between processors as storage independent from the processors where data intended for the other processor is transferred when needed since communication is usually not immediately required. Column

3, lines 47-53 show that this communication is between a processor and coprocessor. In the embodiment of figure 3, the communication is also between the processor and coprocessor.

d. and said control logic operative to facilitate the reading of said stored data by said processor and said co-processor. As shown above, the control logic generates memory control signals and requests, which facilitate the reading of stored data during the communication between the processors.

31. In regard to claim 12, Rutman discloses the interface of claim 11, wherein said boundary comprises a printed circuit board-to-printed circuit board connector coupled between said processor and said co-processor. Column 1, lines 23-25 show that the shared memory is a separate entity. With the memory being on a separate chip or circuit board and the processor and co-processor communicating via serial ports, as shown previously, the use of a circuit board-to circuit board connector in the form of a serial connector or cable must be used to couple the processor and co-processor to the memory. Since the processor and co-processor are coupled to the same memory, they are also coupled to each other.

32. In regard to claim 13, Rutman discloses the interface of claim 11, wherein said processor communicates with a first protocol and said co-processor communicates with a second protocol, said boundary comprising a difference between said first and second protocols. The enclosed second IEEE definition of "protocol" shows that a protocol includes conventions governing the format of message exchange between two communication terminals. As shown above, the processor and co-processor of Rutman

communicate and are thus communication terminals. Column 5, lines 54-58 show that the processor and coprocessor operate with different bus widths. This means that the format of any communication or message exchange between the processor and coprocessor will be initially be of a different format and thus the processor and coprocessor communicate with different protocols. Since Rutman discloses the ability of communication between a processor and coprocessor of different widths, he inherently includes as part of the interface a means for compromising the two protocols so that communication can occur.

33. In regard to claim 14, Rutman discloses the interface of claim 11, wherein said processor is a network processor. The included IEEE definition of "network" as it pertains to data transmission is a series of points interconnected by communication channels. Since the processor (one point) is communicating with the co-processor (a second point) as shown above, the processor is communicating over a network and is thus a network processor.

34. In regard to claim 15, Rutman discloses the interface of claim 11, wherein said co-processor is a task specific processor. Figure 3 shows that the co-processor (P2) is a graphics accelerator, thus performing the specific task of graphics acceleration.

35. In regard to claim 18, Rutman discloses the interface of claim 11, wherein said control logic signals said processor when said co-processor has stored data to said memory. As shown above, the control logic sends signals to the memory and processor for their interaction. Column 1, lines 23-28 show that polling or interrupts are used in

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each processor so that each processor knows when data to be accessed is placed in the shared memory.

36. In regard to claim 19, Rutman discloses the interface of claim 11, wherein said control logic signals said co-processor when said processor has written data to said memory. As shown above, the control logic sends signals to the memory and processor for their interaction. Column 1, lines 23-28 show that polling or interrupts are used in each processor so that each processor knows when data to be accessed is placed in the shared memory.

37. In regard to claim 22, Rutman discloses the interface of claim 11, wherein said interface allows said processor to operate independently of the interface requirements of said co-processor. As shown above, the communication (an operation) between the processor and co-processor is made independent by the use of the shared memory that is accessed when the data is needed.

38. In regard to claim 23, Rutman discloses the interface of claim 11, wherein said processor is located on a first circuit board and said co-processor is located on a second circuit board coupled with said first circuit board by a first connector, said first connector characterized by at least one electrical characteristic, said interface operative to isolate said processor and said co-processor from said at least one electrical characteristic. Column 5, lines 54-58 show that the processor and co-processor have different bus sizes. With the two processors having different widths, they cannot be on the same circuit board since every connection to each processor is of a different length. As shown above, the processor and co-processor are each coupled to the memory by

serial ports and thus to each other using a first connect from the processor and a second connector from the co-processor. Due to the different bus sizes, the processor and co-processor are connected to the memory with connectors that each have different electrical characteristics due to the inherently different effective connector widths. Since the interface connects the processor and co-processor it inherently isolates the different electrical characteristics of the connectors so that communication can occur.

39. In regard to claim 24, Rutman discloses a method of interfacing a processor (figure 3, P1) with a co-processor (P2) across a boundary, said processor and said co-processor being separated by said boundary, said method comprising:

- (a) receiving first data from said processor via a first interface;
- (b) storing said first data in a memory;
- (c) signaling said co-processor that said first data has been stored;
- (d) receiving a read command from said co-processor via a second interface;
- (e) providing said first data to said co-processor via said second interface across said boundary.

Figure 3 shows that the processor (P1) is coupled to port A (a first interface) of the memory and the co-processor (P2) is coupled to port B (a second interface) of a VRAM memory. Column 3, lines 15-34 show that the memory is used for communication between processors as storage independent from the processors where data intended for the other processor is transferred when needed since communication is usually not immediately required. Column 3, lines 47-53 show that this communication is between a processor and coprocessor. In the embodiment of figure 3, the communication is also

between the processor and coprocessor. Column 4, lines 26-28 show that arbitration is performed to determine which port has access to the memory and thus the arbiter (280) is coupled to the ports. In addition, column 4, lines 38-41 show that P2 CTL (340) generates memory control signals and column 5, lines 5-8 show that P1 CTL (350) generates memory requests (read requests or commands) for the arbiter. P1 CTL (350) and P2 CTL (340) are both shown in the figure to be coupled to the arbiter and thus are also indirectly coupled to the ports. This control logic generates memory control signals and requests, which facilitate the reading of stored data during the communication between the processors. Column 1, lines 23-28 show that polling or interrupts are used in each processor so that each processor knows when data to be accessed is placed or stored in the shared memory.

40. In regard to claim 25, Rutman discloses the method of claim 24, further comprising:

- (f) receiving second data from said co-processor via said second interface;
- (g) storing said second data in said memory;
- (h) signaling said processor that said second data has been stored;
- (i) receiving a read command from said processor via said first interface;
- (j) providing said second data to said processor via said first interface across said boundary.

The above method functionality is shown to work for communication by both the processor and co-processor and thus the argument fits the limitations of this claim as well.

41. In regard to claim 26, Rutman discloses the method of claim 24, wherein said providing further comprises providing said first data across a boundary comprising a printed circuit board-to-printed circuit board connector. Column 1, lines 23-25 show that the shared memory is a separate entity. With the memory being on a separate chip or circuit board and the processor and co-processor communicating via serial ports, as shown previously, the use of a circuit board-to circuit board connector in the form of a serial connector or cable must be used to couple the processor and co-processor to the memory.

42. In regard to claim 27, Rutman discloses the method of claim 24, said method further comprising using a network processor as said processor. The included IEEE definition of "network" as it pertains to data transmission is a series of points interconnected by communication channels. Since the processor (one point) is communicating with the co-processor (a second point) as shown above, the processor is communicating over a network and is thus a network processor.

43. In regard to claim 28, Rutman discloses the method of claim 24, said method comprising using a task specific processor as said co-processor. Figure 3 shows that the co-processor (P2) is a graphics accelerator, thus performing the specific task of graphics acceleration.

44. In regard to claim 31, Rutman discloses the method of claim 24, wherein said signaling is performed by control logic signal coupled with said memory. As shown above, figure 3 shows the stated the control logic that performs signaling is coupled to the memory.

45. In regard to claim 34, Rutman discloses an apparatus for facilitating communications between a first processor (figure 3, element 270) and a second processor (element 260) comprising:

- a. a dual port memory (figure 3, element 200) coupled with said first processor via first interface (element B) and said second processors via a second interface (element A), and operative to act as a message buffer between said first processor and said second processor; Figure 3 shows the memory is a 3-port VRAM with dual serial ports (A and B to serial 1 and serial 2). Column 3, lines 15-34 show that the memory is used for communication between processors as storage independent from the processors where data intended for the other processor is transferred when needed since communication is usually not immediately required.
- b. control logic coupled with said dual ported memory and operative to detect communications by one of said first and second processors and inform the other of said first and second processors of said communications. Column 4, lines 26-28 show that arbitration is performed to determine which port has access to the memory and thus the arbiter (280) is coupled to the ports. In addition, column 4, lines 38-41 show that P2 CTL (340) generates memory control signals and column 5, lines 5-8 show that P1 CTL (350) generates memory requests (read requests or commands) for the arbiter. P1 CTL (350) and P2 CTL (340) are both shown in the figure to be coupled to the arbiter and thus are also indirectly coupled to the ports. This control logic generates memory control signals and

requests, which facilitate the reading of stored data during the communication between the processors. Column 1, lines 23-28 show that polling or interrupts are used in each processor so that each processor knows when data to be accessed is placed or stored in the shared memory.

46. In regard to claim 35, Rutman discloses the apparatus of claim 34, wherein said first processor comprises a network processor. The included IEEE definition of "network" as it pertains to data transmission is a series of points interconnected by communication channels. Since the first processor (one point) is communicating with the second processor (a second point) as shown above, the first processor is communicating over a network and is thus a network processor.

47. In regard to claim 36, Rutman discloses the apparatus of claim 34, wherein said second processor comprises a task specific processor. Figure 3 shows that the second processor (P2) is a graphics accelerator, thus performing the specific task of graphics acceleration.

48. In regard to claim 39 Rutman discloses the apparatus of claim 34, wherein said control logic signals said first processor when said second processor has written data to said dual ported memory and said control logic signals said second processor when said first processor has written data to said dual ported memory. As shown above, the control logic sends signals to the memory and processor for their interaction. Column 1, lines 23-28 show that polling or interrupts are used in each processor so that each processor knows when data to be accessed is placed in the shared memory.

Claim Rejections - 35 USC § 103

49. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

50. Claims 6, 7, 16, 17, 29, 30, 37, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rutman in view of McCormack (5,870,109).

51. In regard to claim 6,

- a. Rutman discloses the packet processing system of claim 5, where the co-processor (P2) is a graphics accelerator as shown in figure 3.
- b. Rutman does not disclose wherein said co-processor comprises a content addressable memory.
- c. McCormack has disclosed the use of an overlap detector implemented as a content addressable memory on a graphics accelerator chip (column 3, lines 20-39). Column 2, lines 34-36 show that an object of the invention is to avoid graphic image overlap error in digital graphic imaging, so the overlap detection is needed.
- d. McCormack has taught in column 1, lines 41-48 that overlap creates inconsistencies where incorrect data can be used causing an unacceptable error. The detection of overlap so that this error is avoided would have motivated one of ordinary skill in the art to use the overlap detector implemented as a content addressable memory as taught by McCormack in the graphic accelerator co-processor design of Rutman.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the graphics accelerator co-processor design of Rutman to incorporate the overlap detector implemented as a content addressable memory on a graphics accelerator as taught by McCormack so that unacceptable data errors are avoided.

52. In regard to claim 7,

- a. Rutman discloses the packet processing system of claim 5; Paragraphs 57 and 58 of the specification states that the classification or CAM processors are used to facilitate certain search and compare operations that would otherwise be computationally intensive and degrade the performance of the processor. Therefore, the examiner is taking a classification processor to be any processor that uses search and compare operations to improve system performance as stated above. Column 1, lines 11-22 of Rutman show that the co-processor of the disclosed system increases system efficiency and thus performance.
- b. Rutman does not disclose wherein said co-processor is a classification processor.
- c. McCormack has disclosed the use of an overlap detector implemented as a content addressable memory on a graphics accelerator chip in column 3, lines 20-39. This section also shows that values are detected (or searched for) and then compared, thus the graphics accelerator performs search and compare operations. Column 2, lines 34-36 show that an object of the invention is to avoid graphic image overlap error in digital graphic imaging, so the overlap detection is needed.

d. McCormack has taught in column 1, lines 41-48 that overlap creates inconsistencies where incorrect data can be used causing an unacceptable error. The detection of overlap so that this error is avoided would have motivated one of ordinary skill in the art to use the overlap detector implemented as a content addressable memory as taught by McCormack in the graphic accelerator co-processor design of Rutman.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the graphics accelerator co-processor design of Rutman to incorporate the overlap detector implemented as a content addressable memory on a graphics accelerator as taught by McCormack so that unacceptable data errors are avoided.

53. In regard to claim 16,

- a. Rutman discloses the interface of claim 15, where the co-processor (P2) is a graphics accelerator as shown in figure 3.
- b. Rutman does not disclose wherein said co-processor comprises a content addressable memory.
- c. McCormack has disclosed the use of an overlap detector implemented as a content addressable memory on a graphics accelerator chip (column 3, lines 20-39). Column 2, lines 34-36 show that an object of the invention is to avoid graphic image overlap error in digital graphic imaging, so the overlap detection is needed.
- d. McCormack has taught in column 1, lines 41-48 that overlap creates inconsistencies where incorrect data can be used causing an unacceptable error.

The detection of overlap so that this error is avoided would have motivated one of ordinary skill in the art to use the overlap detector implemented as a content addressable memory as taught by McCormack in the graphic accelerator co-processor design of Rutman.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the graphics accelerator co-processor design of Rutman to incorporate the overlap detector implemented as a content addressable memory on a graphics accelerator as taught by McCormack so that unacceptable data errors are avoided.

54. In regard to claim 17,

a. Rutman discloses the interface of claim 15; Paragraphs 57 and 58 of the specification states that the classification or CAM processors are used to facilitate certain search and compare operations that would otherwise be computationally intensive and degrade the performance of the processor.

Therefore, the examiner is taking a classification processor to be any processor that uses search and compare operations to improve system performance as stated above. Column 1, lines 11-22 of Rutman show that the co-processor of the disclosed system increases system efficiency and thus performance.

b. Rutman does not disclose wherein said co-processor is a classification processor.

c. McCormack has disclosed the use of an overlap detector implemented as a content addressable memory on a graphics accelerator chip in column 3, lines 20-39. This section also shows that values are detected (or searched for) and

then compared, thus the graphics accelerator performs search and compare operations. Column 2, lines 34-36 show that an object of the invention is to avoid graphic image overlap error in digital graphic imaging, so the overlap detection is needed.

d. McCormack has taught in column 1, lines 41-48 that overlap creates inconsistencies where incorrect data can be used causing an unacceptable error. The detection of overlap so that this error is avoided would have motivated one of ordinary skill in the art to use the overlap detector implemented as a content addressable memory as taught by McCormack in the graphic accelerator co-processor design of Rutman.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the graphics accelerator co-processor design of Rutman to incorporate the overlap detector implemented as a content addressable memory on a graphics accelerator as taught by McCormack so that unacceptable data errors are avoided.

55. In regard to claim 29,

a. Rutman discloses the method of claim 28, where said co-processor (P2) is a graphics accelerator as shown in figure 3.

b. Rutman does not disclose wherein said co-processor comprises a content addressable memory.

c. McCormack has disclosed the use of an overlap detector implemented as a content addressable memory on a graphics accelerator chip (column 3, lines 20-39). Column 2, lines 34-36 show that an object of the invention is to avoid

graphic image overlap error in digital graphic imaging, so the overlap detection is needed.

d. McCormack has taught in column 1, lines 41-48 that overlap creates inconsistencies where incorrect data can be used causing an unacceptable error. The detection of overlap so that this error is avoided would have motivated one of ordinary skill in the art to use the overlap detector implemented as a content addressable memory as taught by McCormack in the graphic accelerator co-processor design of Rutman.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the graphics accelerator co-processor design of Rutman to incorporate the overlap detector implemented as a content addressable memory on a graphics accelerator as taught by McCormack so that unacceptable data errors are avoided.

56. In regard to claim 30,

a. Rutman discloses the method of claim 28; Paragraphs 57 and 58 of the specification states that the classification or CAM processors are used to facilitate certain search and compare operations that would otherwise be computationally intensive and degrade the performance of the processor. Therefore, the examiner is taking a classification processor to be any processor that uses search and compare operations to improve system performance as stated above. Column 1, lines 11-22 of Rutman show that the co-processor of the disclosed system increases system efficiency and thus performance.

b. Rutman does not disclose wherein said co-processor is a classification processor.

c. McCormack has disclosed the use of an overlap detector implemented as a content addressable memory on a graphics accelerator chip in column 3, lines 20-39. This section also shows that values are detected (or searched for) and then compared, thus the graphics accelerator performs search and compare operations. Column 2, lines 34-36 show that an object of the invention is to avoid graphic image overlap error in digital graphic imaging, so the overlap detection is needed.

d. McCormack has taught in column 1, lines 41-48 that overlap creates inconsistencies where incorrect data can be used causing an unacceptable error. The detection of overlap so that this error is avoided would have motivated one of ordinary skill in the art to use the overlap detector implemented as a content addressable memory as taught by McCormack in the graphic accelerator co-processor design of Rutman.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the graphics accelerator co-processor design of Rutman to incorporate the overlap detector implemented as a content addressable memory on a graphics accelerator as taught by McCormack so that unacceptable data errors are avoided.

57. In regard to claim 37,

a. Rutman discloses the apparatus of claim 36, where said second processor (P2) is a graphics accelerator as shown in figure 3.

b. Rutman does not disclose wherein said co-processor comprises a content addressable memory.

c. McCormack has disclosed the use of an overlap detector implemented as a content addressable memory on a graphics accelerator chip (column 3, lines 20-39). Column 2, lines 34-36 show that an object of the invention is to avoid graphic image overlap error in digital graphic imaging, so the overlap detection is needed.

d. McCormack has taught in column 1, lines 41-48 that overlap creates inconsistencies where incorrect data can be used causing an unacceptable error. The detection of overlap so that this error is avoided would have motivated one of ordinary skill in the art to use the overlap detector implemented as a content addressable memory as taught by McCormack in the graphic accelerator processor design of Rutman.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the graphics accelerator processor design of Rutman to incorporate the overlap detector implemented as a content addressable memory on a graphics accelerator as taught by McCormack so that unacceptable data errors are avoided.

58. In regard to claim 38,

a. Rutman discloses the apparatus of claim 36; Paragraphs 57 and 58 of the specification states that the classification or CAM processors are used to facilitate certain search and compare operations that would otherwise be computationally intensive and degrade the performance of the processor.

Therefore, the examiner is taking a classification processor to be any processor that uses search and compare operations to improve system performance as stated above. Column 1, lines 11-22 of Rutman show that the co-processor of the disclosed system increases system efficiency and thus performance.

b. Rutman does not disclose wherein said second processor is a classification processor.

c. McCormack has disclosed the use of an overlap detector implemented as a content addressable memory on a graphics accelerator chip in column 3, lines 20-39. This section also shows that values are detected (or searched for) and then compared, thus the graphics accelerator performs search and compare operations. Column 2, lines 34-36 show that an object of the invention is to avoid graphic image overlap error in digital graphic imaging, so the overlap detection is needed.

d. McCormack has taught in column 1, lines 41-48 that overlap creates inconsistencies where incorrect data can be used causing an unacceptable error. The detection of overlap so that this error is avoided would have motivated one of ordinary skill in the art to use the overlap detector implemented as a content addressable memory as taught by McCormack in the graphic accelerator processor design of Rutman.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the graphics accelerator processor design of Rutman to incorporate the overlap

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detector implemented as a content addressable memory on a graphics accelerator as taught by McCormack so that unacceptable data errors are avoided.

59. Claims 10, 20, 32, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rutman in view of Prince (High Performance Memories).

60. In regard to claim 10,

a. Rutman discloses the packet processing system of claim 1, wherein said memory comprises a dual ported random access memory. Figure 3 shows that the memory 200 is a 3-port (with dual serial ports) VRAM, or video random access memory.

b. Rutman does not disclose that the memory is a sync-burst static memory. Applicant has disclosed in paragraph 81 that a sync-burst static random access memory is also known as an SSRAM.

c. Prince has disclosed on pages 90-91 the design of an SSRAM chip.

d. Prince has taught on pages 2 and 18 that SSRAM technology is faster than both asynchronous SRAM technology and DRAM technology, and thus is more attractive due to the lack of wait states. This memory speed would have motivated one of ordinary skill in the art to modify the design of Rutman to use an SSRAM taught by Prince as the memory device.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Rutman to use a synchronous burst (sync-burst) static random access memory as said memory so that a fast memory technology is used to boost performance as taught by Prince.

61. In regard to claim 20,

- a. Rutman discloses the interface of claim 11, wherein said memory comprises a dual ported random access memory. Figure 3 shows that the memory 200 is a 3-port (with dual serial ports) VRAM, or video random access memory.
- b. Rutman does not disclose that the memory is a sync-burst static memory. Applicant has disclosed in paragraph 81 that a sync-burst static random access memory is also known as an SSRAM.
- c. Prince has disclosed on pages 90-91 the design of an SSRAM chip.
- d. Prince has taught on pages 2 and 18 that SSRAM technology is faster than both asynchronous SRAM technology and DRAM technology, and thus is more attractive due to the lack of wait states. This memory speed would have motivated one of ordinary skill in the art to modify the design of Rutman to use an SSRAM taught by Prince as the memory device.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Rutman to use a synchronous burst (sync-burst) static random access memory as said memory so that a fast memory technology is used to boost performance as taught by Prince.

62. In regard to claim 32,

- a. Rutman discloses the method of claim 24, wherein said memory comprises a dual ported random access memory. Figure 3 shows that the

memory 200 is a 3-port (with dual serial ports) VRAM, or video random access memory.

b. Rutman does not disclose that the memory is a sync-burst static memory. Applicant has disclosed in paragraph 81 that a sync-burst static random access memory is also known as an SSRAM.

c. Prince has disclosed on pages 90-91 the design of an SSRAM chip.

d. Prince has taught on pages 2 and 18 that SSRAM technology is faster than both asynchronous SRAM technology and DRAM technology, and thus is more attractive due to the lack of wait states. This memory speed would have motivated one of ordinary skill in the art to modify the design of Rutman to use an SSRAM taught by Prince as the memory device.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Rutman to use a synchronous burst (sync-burst) static random access memory as said memory so that a fast memory technology is used to boost performance as taught by Prince.

63. In regard to claim 40,

a. Rutman discloses the apparatus of claim 34, wherein said dual ported memory comprises a dual ported random access memory. Figure 3 shows that the memory 200 is a 3-port (with dual serial ports) VRAM, or video random access memory.

b. Rutman does not disclose that the memory is a sync-burst static memory.

Applicant has disclosed in paragraph 81 that a sync-burst static random access memory is also known as an SSRAM.

c. Prince has disclosed on pages 90-91 the design of an SSRAM chip.

d. Prince has taught on pages 2 and 18 that SSRAM technology is faster than both asynchronous SRAM technology and DRAM technology, and thus is more attractive due to the lack of wait states. This memory speed would have motivated one of ordinary skill in the art to modify the design of Rutman to use an SSRAM taught by Prince as the memory device.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Rutman to use a synchronous burst (sync-burst) static random access memory as said memory so that a fast memory technology is used to boost performance as taught by Prince.

64. Claims 21, 33, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rutman.

65. In regard to claim 21,

a. Rutman discloses the interface of claim 11,

b. Rutman as applied to claim 11 does not disclose wherein said interface allows said processor to communicate with said co-processor as if said co-processor was directly connected with said processor.

c. The background section of Rutman has disclosed in column 1, lines 20-22 shows that there are embodiments where only a bus is used as the interface

for communication between processors. This would provide a direct connection between the processor and co-processor previously disclosed.

d. It is clear through inspection of the entire Rutman disclosure that using only a bus as the interface, rather than the shared memory with control logic and the bus, would use significantly less hardware and thus have a smaller area. This smaller area would have motivated one of ordinary skill in the art to modify the design of Rutman as applied to claim 11 to use only a bus as the interface between the processor and co-processor as taught by Rutman in the background.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Rutman as applied to claim 11 and use only a bus as the interface between the processor and coprocessor as taught by the background of Rutman so that less hardware may be used yielding a smaller area.

66. In regard to claim 33,

- a. Rutman discloses the method of claim 24,
- b. Rutman as applied to claim 11 does not disclose wherein said processor communicates with said co-processor as if said co-processor was directly connected with said processor.
- c. The background section of Rutman has disclosed in column 1, lines 20-22 shows that there are embodiments where only a bus is used as the interface for communication between processors. This would provide a direct connection between the processor and co-processor previously disclosed.

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d. It is clear through inspection of the entire Rutman disclosure that using only a bus as the interface, rather than the shared memory with control logic and the bus, would use significantly less hardware and thus have a smaller area. This smaller area would have motivated one of ordinary skill in the art to modify the design of Rutman as applied to claim 11 to use only a bus as the interface between the processor and co-processor as taught by Rutman in the background.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Rutman as applied to claim 11 and use only a bus as the interface between the processor and coprocessor as taught by the background of Rutman so that less hardware may be used yielding a smaller area.

67. In regard to claim 41,

- a. Rutman discloses the apparatus of claim 34,
- b. Rutman as applied to claim 11 does not disclose wherein said first processor communicates with said second processor as if said second processor was directly connected with said first processor.
- c. The background section of Rutman has disclosed in column 1, lines 20-22 shows that there are embodiments where only a bus is used as the interface for communication between processors. This would provide a direct connection between the first processor and second processor previously disclosed.
- d. It is clear through inspection of the entire Rutman disclosure that using only a bus as the interface, rather than the shared memory with control logic and

the bus, would use significantly less hardware and thus have a smaller area.

This smaller area would have motivated one of ordinary skill in the art to modify the design of Rutman as applied to claim 11 to use only a bus as the interface between the first processor and second processor as taught by Rutman in the background.

It would have been obvious to one of ordinary skill in the art at the time of invention to modify the design of Rutman as applied to claim 11 and use only a bus as the interface between the first processor and second processor as taught by the background of Rutman so that less hardware may be used yielding a smaller area.

Conclusion

68. The following is text cited from 37 CFR 1.111(c): In amending in reply to a rejection of claims in an application or patent under reexamination, the applicant or patent owner must clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. The applicant or patent owner must also show how the amendments avoid such references or objections.

69. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents have been cited to further show the art with respect to multi-processor communication using shared memories.

US Pat No 6,295,599 to Hansen discloses a multiple processor system with a shared memory and arbitration scheme where data to and from each processing element shares the same memory and bus.

US Pat No 6,438,678 to Cashman teaches a shared memory used for as an interface for communication between processors.

US Pat No 5,987,568 to Adams shows coprocessor to processor communication where data is sent to the peripherals (a coprocessor in one case) via a shared memory.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shane F Gerstl whose telephone number is (703)305-7305. The examiner can normally be reached on M-F 6:45-4:15 (First Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on (703)305-9712. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Shane F Gerstl
Examiner
Art Unit 2183

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